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SANGAR, DAVID V.
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RIJNBRAND, RENE

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45 tat ggc aat gag ggt tgc ggg tgg gcg gga tgg ctc ctg tct ccc cgt 644
Tyr Gly Asn Glu Gly Cys Gly Trp Ala Gly Trp Leu Leu Ser Pro Arg
90 95 100

50 ggc tct cgg cct agc tgg ggc ccc aca gac ccc cgg cgt agg tcg cgc 692
Gly Ser Arg Pro Ser Trp Gly Pro Thr Asp Pro Arg Arg Arg Ser Arg
105 110 115

55 aat ttg ggt aag gtc atc gat acc ctt acg tgc ggc ttc gcc gac ctc 740
Asn Leu Gly Lys Val Ile Asp Thr Leu Thr Cys Gly Phe Ala Asp Leu
120 125 130

60 atg ggg tac ata ccg ctc gtc ggc gcc cct ctt gga ggc gct gcc agg 788
Met Gly Tyr Ile Pro Leu Val Gly Ala Pro Leu Gly Gly Ala Ala Arg
135 140 145

65 gcc ctg gcg cat ggc gtc cgg gtt ctg gaa gac ggc gtg aac tat gca 836
Ala Leu Ala His Gly Val Arg Val Leu Glu Asp Gly Val Asn Tyr Ala
150 155 160 165

70 aca ggg aac ctt cct ggt tgc tct ttc tct atc ttc ctt ctg gcc ctg 884
Thr Gly Asn Leu Pro Gly Cys Ser Phe Ser Ile Phe Leu Leu Ala Leu
170 175 180

75 ctc tct tgc ctg act gtg ccc gct tca gcc tac caa gtg cgc aat tcc 932
Leu Ser Cys Leu Thr Val Pro Ala Ser Ala Tyr Gln Val Arg Asn Ser
185 190 195

	tcg ggg ctt tac cat gtc acc aat gat tgc cct aac tcg agt att gtg	980
	Ser Gly Leu Tyr His Val Thr Asn Asp Cys Pro Asn Ser Ser Ile Val	
	200 205 210	
5	tac gag gcg gcc gat gcc atc ctg cac act ccg ggg tgt gtc cct tgc	1028
	Tyr Glu Ala Ala Asp Ala Ile Leu His Thr Pro Gly Cys Val Pro Cys	
	215 220 225	
10	gtt cgc gag ggt aac gcc tcg agg tgt tgg gtg gcg gtg acc ccc acg	1076
	Val Arg Glu Gly Asn Ala Ser Arg Cys Trp Val Ala Val Thr Pro Thr	
	230 235 240 245	
15	gtg gcc acc agg gac gcc aaa ctc ccc aca acg cag ctt cga cgt cat	1124
	Val Ala Thr Arg Asp Gly Lys Leu Pro Thr Thr Gln Leu Arg Arg His	
	250 255 260	
20	atc gat ctg ctt gtc ggg agc gcc acc ctc tgc tcg gcc ctc tac gtg	1172
	Ile Asp Leu Leu Val Gly Ser Ala Thr Leu Cys Ser Ala Leu Tyr Val	
	265 270 275	
25	ggg gac ctg tgc ggg tct gtc ttt ctt gtt ggt caa ctg ttt acc ttc	1220
	Gly Asp Leu Cys Gly Ser Val Phe Leu Val Gly Gln Leu Phe Thr Phe	
	280 285 290	
30	tct ccc agg cgc cac tgg acg acg caa gac tgc aat tgt tct atc tat	1268
	Ser Pro Arg Arg His Trp Thr Thr Gln Asp Cys Asn Cys Ser Ile Tyr	
	295 300 305	
35	ccc gcc cat ata acg ggt cat cgc atg gca tgg gat atg atg atg aac	1316
	Pro Gly His Ile Thr Gly His Arg Met Ala Trp Asp Met Met Met Asn	
	310 315 320 325	
40	tgg tcc cct acg gca gcg ttg gtg gta gct cag ctg ctc cgg atc cca	1364
	Trp Ser Pro Thr Ala Ala Leu Val Val Ala Gln Leu Leu Arg Ile Pro	
	330 335 340	
45	caa gcc atc atg gac atg atc gct ggt gct cac tgg gga gtc ctg gcg	1412
	Gln Ala Ile Met Asp Met Ile Ala Gly Ala His Trp Gly Val Leu Ala	
	345 350 355	
50	ggc ata gcg tat ttc tcc atg gtg ggg aac tgg gcg aag gtc ctg gta	1460
	Gly Ile Ala Tyr Phe Ser Met Val Gly Asn Trp Ala Lys Val Leu Val	
	360 365 370	
55	gtg ctg ctg cta ttt gcc ggc gtc gac gcg gaa acc cac gtc acc ggg	1508
	Val Leu Leu Leu Phe Ala Gly Val Asp Ala Glu Thr His Val Thr Gly	
	375 380 385	
60	gga aat gcc ggc cgc acc acg gct ggg ctt gtt ggt ctc ctt aca cca	1556
	Gly Asn Ala Gly Arg Thr Thr Ala Gly Leu Val Gly Leu Leu Thr Pro	
	390 395 400 405	
65	ggc gcc aag cag aac atc caa ctg atc aac acc aac ggc agt tgg cac	1604
	Gly Ala Lys Gln Asn Ile Gln Leu Ile Asn Thr Asn Gly Ser Trp His	
	410 415 420	
70	atc aat agc acg gcc ttg aat tgc aat gaa agc ctt aac acc ggc tgg	1652
	Ile Asn Ser Thr Ala Leu Asn Cys Asn Glu Ser Leu Asn Thr Gly Trp	
	425 430 435	
75	tta gca ggg ctc ttc tat caa cac aaa ttc aac tct tca ggc tgt cct	1700
	Leu Ala Gly Leu Phe Tyr Gln His Lys Phe Asn Ser Ser Gly Cys Pro	
	440 445 450	
80	gag agg ttg gcc agc tgc cga cgc ctt acc gat ttt gcc cag ggc tgg	1748

	Glu	Arg	Leu	Ala	Ser	Cys	Arg	Arg	Leu	Thr	Asp	Phe	Ala	Gln	Gly	Trp	
	455						460					465					
5	ggt	cct	atc	agt	tat	gcc	aac	gga	agc	ggc	ctc	gac	gaa	cgc	ccc	tac	1796
	Gly	Pro	Ile	Ser	Tyr	Ala	Asn	Gly	Ser	Gly	Leu	Asp	Glu	Arg	Pro	Tyr	
	470					475					480					485	
10	tgc	tgg	cac	tac	cct	cca	aga	cct	tgt	ggc	att	gtg	ccc	gca	aag	agc	1844
	Cys	Trp	His	Tyr	Pro	Pro	Arg	Pro	Cys	Gly	Ile	Val	Pro	Ala	Lys	Ser	
					490					495					500		
15	gtg	tgt	ggc	ccg	gta	tat	tgc	ttc	act	ccc	agc	ccc	gtg	gtg	gtg	gga	1892
	Val	Cys	Gly	Pro	Val	Tyr	Cys	Phe	Thr	Pro	Ser	Pro	Val	Val	Val	Gly	
				505					510					515			
20	acg	acc	gac	agg	tcg	ggc	gcg	cct	acc	tac	agc	tgg	ggg	gca	aat	gat	1940
	Thr	Thr	Asp	Arg	Ser	Gly	Ala	Pro	Thr	Tyr	Ser	Trp	Gly	Ala	Asn	Asp	
			520					525					530				
25	acg	gat	gtc	ttc	gtc	ctt	aac	aac	acc	agg	cca	ccg	ctg	ggc	aat	tgg	1988
	Thr	Asp	Val	Phe	Val	Leu	Asn	Asn	Thr	Arg	Pro	Pro	Leu	Gly	Asn	Trp	
		535					540					545					
30	ttc	ggt	tgt	acc	tgg	atg	aac	tca	act	gga	ttc	acc	aaa	gtg	tgc	gga	2036
	Phe	Gly	Cys	Thr	Trp	Met	Asn	Ser	Thr	Gly	Phe	Thr	Lys	Val	Cys	Gly	
	550					555					560					565	
35	gcg	ccc	cct	tgt	gtc	atc	gga	ggg	gtg	ggc	aac	aac	acc	ttg	ctc	tgc	2084
	Ala	Pro	Pro	Cys	Val	Ile	Gly	Gly	Val	Gly	Asn	Asn	Thr	Leu	Leu	Cys	
					570					575					580		
40	ccc	act	gat	tgc	ttc	cgc	aaa	cat	ccg	gaa	gcc	aca	tac	tct	cgg	tgc	2132
	Pro	Thr	Asp	Cys	Phe	Arg	Lys	His	Pro	Glu	Ala	Thr	Tyr	Ser	Arg	Cys	
				585					590					595			
45	ggc	tcc	ggt	ccc	tgg	att	aca	ccc	agg	tgc	atg	gtc	gac	tac	ccg	tat	2180
	Gly	Ser	Gly	Pro	Trp	Ile	Thr	Pro	Arg	Cys	Met	Val	Asp	Tyr	Pro	Tyr	
			600					605					610				
50	agg	ctt	tgg	cac	tat	cct	tgt	acc	atc	aat	tac	acc	ata	ttc	aaa	gtc	2228
	Arg	Leu	Trp	His	Tyr	Pro	Cys	Thr	Ile	Asn	Tyr	Thr	Ile	Phe	Lys	Val	
		615					620					625					
55	agg	atg	tac	gtg	gga	ggg	gtc	gag	cac	agg	ctg	gaa	gcg	gcc	tgc	aac	2276
	Arg	Met	Tyr	Val	Gly	Gly	Val	Glu	His	Arg	Leu	Glu	Ala	Ala	Cys	Asn	
	630					635					640					645	
60	tgg	acg	cgg	ggc	gaa	cgc	tgt	gat	ctg	gaa	gac	agg	gac	agg	tcc	gag	2324
	Trp	Thr	Arg	Gly	Glu	Arg	Cys	Asp	Leu	Glu	Asp	Arg	Arg	Arg	Ser	Glu	
					650					655					660		
65	ctc	agc	ccg	ttg	ctg	ctg	tcc	acc	aca	cag	tgg	cag	gtc	ctt	ccg	tgt	2372
	Leu	Ser	Pro	Leu	Leu	Leu	Ser	Thr	Thr	Gln	Trp	Gln	Val	Leu	Pro	Cys	
				665					670					675			
70	tct	ttc	acg	acc	ctg	cca	gcc	ttg	tcc	acc	ggc	ctc	atc	cac	ctc	cac	2420
	Ser	Phe	Thr	Thr	Leu	Pro	Ala	Leu	Ser	Thr	Gly	Leu	Ile	His	Leu	His	
			680					685					690				
75	cag	aac	att	gtg	gac	gtg	cag	tac	ttg	tac	ggg	gta	ggg	tca	agc	atc	2468
	Gln	Asn	Ile	Val	Asp	Val	Gln	Tyr	Leu	Tyr	Gly	Val	Gly	Ser	Ser	Ile	
		695					700					705					
80	gcg	tcc	tgg	gcc	att	aag	tgg	gag	tac	gtc	gtt	ctc	ctg	ttc	ctt	ctg	2516
	Ala	Ser	Trp	Ala	Ile	Lys	Trp	Glu	Tyr	Val	Val	Leu	Leu	Phe	Leu	Leu	
	710					715					720					725	

	ctt gca gac gcg cgc gtc tgc tcc tgc ttg tgg atg atg tta ctc ata	2564
	Leu Ala Asp Ala Arg Val Cys Ser Cys Leu Trp Met Met Leu Leu Ile	
	730 735 740	
5	tcc caa gcg gag gcg gct ttg gag aac ctc gta ata ctc aat gca gca	2612
	Ser Gln Ala Glu Ala Ala Leu Glu Asn Leu Val Ile Leu Asn Ala Ala	
	745 750 755	
10	tcc ctg gcc ggg acg cac ggt ctt gtg tcc ttc ctc gtg ttc ttc tgc	2660
	Ser Leu Ala Gly Thr His Gly Leu Val Ser Phe Leu Val Phe Phe Cys	
	760 765 770	
15	ttt gcg tgg tat ctg aag ggt agg tgg gtg ccc gga gcg gtc tac gcc	2708
	Phe Ala Trp Tyr Leu Lys Gly Arg Trp Val Pro Gly Ala Val Tyr Ala	
	775 780 785	
20	ctc tac ggg atg tgg cct ctc ctc ctg ctc ctg ctg gcg ttg cct cag	2756
	Leu Tyr Gly Met Trp Pro Leu Leu Leu Leu Leu Leu Ala Leu Pro Gln	
	790 795 800 805	
25	cgg gca tac gca ctg gac acg gag gtg gcc gcg tcg tgt ggc ggc gtt	2804
	Arg Ala Tyr Ala Leu Asp Thr Glu Val Ala Ala Ser Cys Gly Gly Val	
	810 815 820	
25	gtt ctt gtc ggg tta atg gcg ctg act ctg tcg cca tat tac aag cgc	2852
	Val Leu Val Gly Leu Met Ala Leu Thr Leu Ser Pro Tyr Tyr Lys Arg	
	825 830 835	
30	tat atc agc tgg tgc atg tgg tgg ctt cag tat ttt ctg acc aga gta	2900
	Tyr Ile Ser Trp Cys Met Trp Trp Leu Gln Tyr Phe Leu Thr Arg Val	
	840 845 850	
35	gaa gcg caa ctg cac gtg tgg gtt ccc ccc ctc aac gtc cgg ggg ggg	2948
	Glu Ala Gln Leu His Val Trp Val Pro Pro Leu Asn Val Arg Gly Gly	
	855 860 865	
40	cgc gat gcc gtc atc tta ctc atg tgt gta gta cac ccg acc ctg gta	2996
	Arg Asp Ala Val Ile Leu Leu Met Cys Val Val His Pro Thr Leu Val	
	870 875 880 885	
45	ttt gac atc acc aaa cta ctc ctg gcc atc ttc gga ccg ctt tgg att	3044
	Phe Asp Ile Thr Lys Leu Leu Leu Ala Ile Phe Gly Pro Leu Trp Ile	
	890 895 900	
45	ctt caa gcc agt ttg ctt aaa gtc ccc tac ttc gtg cgc gtt caa ggc	3092
	Leu Gln Ala Ser Leu Leu Lys Val Pro Tyr Phe Val Arg Val Gln Gly	
	905 910 915	
50	ctt ctc cgg atc tgc gcg cta gcg cgg aag ata gcc gga ggt cat tac	3140
	Leu Leu Arg Ile Cys Ala Leu Ala Arg Lys Ile Ala Gly Gly His Tyr	
	920 925 930	
55	gtg caa atg gcc atc atc aag tta ggg gcg ctt act ggc acc tat gtg	3188
	Val Gln Met Ala Ile Ile Lys Leu Gly Ala Leu Thr Gly Thr Tyr Val	
	935 940 945	
60	tat aac cat ctc acc cct ctt cga gac tgg gcg cac aac ggc ctg cga	3236
	Tyr Asn His Leu Thr Pro Leu Arg Asp Trp Ala His Asn Gly Leu Arg	
	950 955 960 965	
65	gat ctg gcc gtg gct gtg gaa cca gtc gtc ttc tcc cga atg gag acc	3284
	Asp Leu Ala Val Ala Val Glu Pro Val Val Phe Ser Arg Met Glu Thr	
	970 975 980	
65	aag ctc atc acg tgg ggg gca gat acc gcc gcg tgc ggt gac atc atc	3332

	Lys	Leu	Ile	Thr	Trp	Gly	Ala	Asp	Thr	Ala	Ala	Cys	Gly	Asp	Ile	Ile	
				985					990					995			
5	aac	ggc	ttg	ccc	gtc	tct	gcc	cgt	agg	ggc	cag	gag	ata	ctg	ctt	ggg	3380
	Asn	Gly	Leu	Pro	Val	Ser	Ala	Arg	Arg	Gly	Gln	Glu	Ile	Leu	Leu	Gly	
		1000						1005					1010				
10	cca	gcc	gac	gga	atg	gtc	tcc	aag	ggg	tgg	agg	ttg	ctg	gcg	ccc	atc	3428
	Pro	Ala	Asp	Gly	Met	Val	Ser	Lys	Gly	Trp	Arg	Leu	Leu	Ala	Pro	Ile	
		1015					1020					1025					
15	acg	gcg	tac	gcc	cag	cag	acg	aga	ggc	ctc	cta	ggg	tgt	ata	atc	acc	3476
	Thr	Ala	Tyr	Ala	Gln	Gln	Thr	Arg	Gly	Leu	Leu	Gly	Cys	Ile	Ile	Thr	
	1030				1035					1040					1045		
	agc	ctg	act	ggc	cgg	gac	aaa	aac	caa	gtg	gag	ggt	gag	gtc	cag	atc	3524
	Ser	Leu	Thr	Gly	Arg	Asp	Lys	Asn	Gln	Val	Glu	Gly	Glu	Val	Gln	Ile	
				1050					1055						1060		
20	gtg	tca	act	gct	acc	caa	acc	ttc	ctg	gca	acg	tgc	atc	aat	ggg	gta	3572
	Val	Ser	Thr	Ala	Thr	Gln	Thr	Phe	Leu	Ala	Thr	Cys	Ile	Asn	Gly	Val	
				1065					1070					1075			
25	tgc	tgg	act	gtc	tac	cac	ggg	gcc	gga	acg	agg	acc	atc	gca	tca	ccc	3620
	Cys	Trp	Thr	Val	Tyr	His	Gly	Ala	Gly	Thr	Arg	Thr	Ile	Ala	Ser	Pro	
		1080					1085						1090				
30	aag	ggt	cct	gtc	atc	cag	atg	tat	acc	aat	gtg	gac	caa	gac	ctt	gtg	3668
	Lys	Gly	Pro	Val	Ile	Gln	Met	Tyr	Thr	Asn	Val	Asp	Gln	Asp	Leu	Val	
		1095				1100						1105					
35	ggc	tgg	ccc	gct	cct	caa	ggt	tcc	cgc	tca	ttg	aca	ccc	tgt	acc	tgc	3716
	Gly	Trp	Pro	Ala	Pro	Gln	Gly	Ser	Arg	Ser	Leu	Thr	Pro	Cys	Thr	Cys	
	1110				1115					1120					1125		
	ggc	tcc	tcg	gac	ctt	tac	ctg	gtc	acg	agg	cac	gcc	gat	gtc	att	ccc	3764
	Gly	Ser	Ser	Asp	Leu	Tyr	Leu	Val	Thr	Arg	His	Ala	Asp	Val	Ile	Pro	
				1130					1135						1140		
40	gtg	cgc	cgg	cga	ggt	gat	agc	agg	ggt	agc	ctg	ctt	tcg	ccc	cgg	ccc	3812
	Val	Arg	Arg	Arg	Gly	Asp	Ser	Arg	Gly	Ser	Leu	Leu	Ser	Pro	Arg	Pro	
				1145				1150						1155			
45	att	tcc	tac	ttg	aaa	ggc	tcc	tcg	ggg	ggt	ccg	ctg	ttg	tgc	ccc	gcg	3860
	Ile	Ser	Tyr	Leu	Lys	Gly	Ser	Ser	Gly	Gly	Pro	Leu	Leu	Cys	Pro	Ala	
		1160					1165					1170					
50	gga	cac	gcc	gtg	ggc	cta	ttc	agg	gcc	gcg	gtg	tgc	acc	cgt	gga	gtg	3908
	Gly	His	Ala	Val	Gly	Leu	Phe	Arg	Ala	Ala	Val	Cys	Thr	Arg	Gly	Val	
		1175				1180					1185						
55	gct	aaa	gcg	gtg	gac	ttt	atc	cct	gtg	gag	aac	cta	ggg	aca	acc	atg	3956
	Ala	Lys	Ala	Val	Asp	Phe	Ile	Pro	Val	Glu	Asn	Leu	Gly	Thr	Thr	Met	
	1190				1195					1200					1205		
	aga	tcc	ccg	gtg	ttc	acg	gac	aac	tcc	tct	cca	cca	gca	gtg	ccc	cag	4004
	Arg	Ser	Pro	Val	Phe	Thr	Asp	Asn	Ser	Ser	Pro	Pro	Ala	Val	Pro	Gln	
				1210					1215						1220		
60	agc	ttc	cag	gtg	gcc	cac	ctg	cat	gct	ccc	acc	ggc	agc	ggt	aag	agc	4052
	Ser	Phe	Gln	Val	Ala	His	Leu	His	Ala	Pro	Thr	Gly	Ser	Gly	Lys	Ser	
				1225				1230						1235			
65	acc	aag	gtc	ccg	gct	gcg	tac	gca	gcc	cag	ggc	tac	aag	gtg	ttg	gtg	4100
	Thr	Lys	Val	Pro	Ala	Ala	Tyr	Ala	Ala	Gln	Gly	Tyr	Lys	Val	Leu	Val	
		1240				1245						1250					

5	ctc aac ccc tct gtt gct gca acg ctg ggc ttt ggt gct tac atg tcc 4148
	Leu Asn Pro Ser Val Ala Ala Thr Leu Gly Phe Gly Ala Tyr Met Ser 1255 1260 1265
10	aag gcc cat ggg gtt gat cct aat atc agg acc ggg gtg aga aca att 4196
	Lys Ala His Gly Val Asp Pro Asn Ile Arg Thr Gly Val Arg Thr Ile 1270 1275 1280 1285
15	acc act ggc agc ccc atc acg tac tcc acc tac ggc aag ttc ctt gcc 4244
	Thr Thr Gly Ser Pro Ile Thr Tyr Ser Thr Tyr Gly Lys Phe Leu Ala 1290 1295 1300
20	gac ggc ggg tgc tca gga ggt gct tat gac ata ata att tgt gac gag 4292
	Asp Gly Gly Cys Ser Gly Gly Ala Tyr Asp Ile Ile Ile Cys Asp Glu 1305 1310 1315
25	tgc cac tcc acg gat gcc aca tcc atc ttg ggc atc ggc act gtc ctt 4340
	Cys His Ser Thr Asp Ala Thr Ser Ile Leu Gly Ile Gly Thr Val Leu 1320 1325 1330
30	gac caa gca gag act gcg ggg gcg aga ctg gtt gtg ctc gcc act gct 4388
	Asp Gln Ala Glu Thr Ala Gly Ala Arg Leu Val Leu Ala Thr Ala 1335 1340 1345
35	acc cct ccg ggc tcc gtc act gtg tcc cat cct aac atc gag gag gtt 4436
	Thr Pro Pro Gly Ser Val Thr Val Ser His Pro Asn Ile Glu Glu Val 1350 1355 1360 1365
40	gct ctg tcc acc acc gga gag atc ccc ttt tac ggc aag gct atc ccc 4484
	Ala Leu Ser Thr Thr Gly Glu Ile Pro Phe Tyr Gly Lys Ala Ile Pro 1370 1375 1380
45	ctc gag gtg atc aag ggg gga aga cat ctc atc ttc tgc cac tca aag 4532
	Leu Glu Val Ile Lys Gly Gly Arg His Leu Ile Phe Cys His Ser Lys 1385 1390 1395
50	aag aag tgc gac gag ctc gcc gcg aag ctg gtc gca ttg ggc atc aat 4580
	Lys Lys Cys Asp Glu Leu Ala Ala Lys Leu Val Ala Leu Gly Ile Asn 1400 1405 1410
55	gcc gtg gcc tac tac cgc ggt ctt gac gtg tct gtc atc ccg acc agc 4628
	Ala Val Ala Tyr Tyr Arg Gly Leu Asp Val Ser Val Ile Pro Thr Ser 1415 1420 1425
60	ggc gat gtt gtc gtc gtg tcg acc gat gct ctc atg act ggc ttt acc 4676
	Gly Asp Val Val Val Val Ser Thr Asp Ala Leu Met Thr Gly Phe Thr 1430 1435 1440 1445
65	ggc gac ttc gac tct gtg ata gac tgc aac acg tgt gtc act cag aca 4724
	Gly Asp Phe Asp Ser Val Ile Asp Cys Asn Thr Cys Val Thr Gln Thr 1450 1455 1460
70	gtc gat ttc agc ctt gac cct acc ttt acc att gag aca acc acg ctc 4772
	Val Asp Phe Ser Leu Asp Pro Thr Phe Thr Ile Glu Thr Thr Thr Leu 1465 1470 1475
75	ccc cag gat gct gtc tcc agg act caa cgc cgg ggc agg act ggc agg 4820
	Pro Gln Asp Ala Val Ser Arg Thr Gln Arg Arg Gly Arg Thr Gly Arg 1480 1485 1490
80	ggg aag cca ggc atc tat aga ttt gtg gca ccg ggg gag cgc ccc tcc 4868
	Gly Lys Pro Gly Ile Tyr Arg Phe Val Ala Pro Gly Glu Arg Pro Ser 1495 1500 1505
85	ggc atg ttc gac tcg tcc gtc ctc tgt gag tgc tat gac gcg ggc tgt 4916

	Gly Met Phe Asp Ser Ser Val Leu Cys Glu Cys Tyr Asp Ala Gly Cys	
	1510 1515 1520 1525	
5	gct tgg tat gag ctc acg ccc gcc gag act aca gtt agg cta cga gcg Ala Trp Tyr Glu Leu Thr Pro Ala Glu Thr Thr Val Arg Leu Arg Ala	4964
	1530 1535 1540	
10	tac atg aac acc ccg ggg ctt ccc gtg tgc cag gac cat ctt gaa ttt Tyr Met Asn Thr Pro Gly Leu Pro Val Cys Gln Asp His Leu Glu Phe	5012
	1545 1550 1555	
15	tgg gag ggc gtc ttt acg ggc ctc act cat ata gat gcc cac ttt tta Trp Glu Gly Val Phe Thr Gly Leu Thr His Ile Asp Ala His Phe Leu	5060
	1560 1565 1570	
	tcc cag aca aag cag agt ggg gag aac ttt cct tac ctg gta gcg tac Ser Gln Thr Lys Gln Ser Gly Glu Asn Phe Pro Tyr Leu Val Ala Tyr	5108
	1575 1580 1585	
20	caa gcc acc gtg tgc gct agg gct caa gcc cct ccc cca tcg tgg gac Gln Ala Thr Val Cys Ala Arg Ala Gln Ala Pro Pro Pro Ser Trp Asp	5156
	1590 1595 1600 1605	
25	cag atg tgg aag tgt ttg atc cgc ctt aaa ccc acc ctc cat ggg cca Gln Met Trp Lys Cys Leu Ile Arg Leu Lys Pro Thr Leu His Gly Pro	5204
	1610 1615 1620	
30	aca ccc ctg cta tac aga ctg ggc gct gtt cag aat gaa gtc acc ctg Thr Pro Leu Leu Tyr Arg Leu Gly Ala Val Gln Asn Glu Val Thr Leu	5252
	1625 1630 1635	
	acg cac cca atc acc aaa tac atc atg aca tgc atg tcg gcc gac ctg Thr His Pro Ile Thr Lys Tyr Ile Met Thr Cys Met Ser Ala Asp Leu	5300
	1640 1645 1650	
35	gag gtc gtc acg agc acc tgg gtg ctc gtt ggc ggc gtc ctg gct gct Glu Val Val Thr Ser Thr Trp Val Leu Val Gly Gly Val Leu Ala Ala	5348
	1655 1660 1665	
40	ctg gcc gcg tat tgc ctg tca aca ggc tgc gtg gtc ata gtg ggc agg Leu Ala Ala Tyr Cys Leu Ser Thr Gly Cys Val Val Ile Val Gly Arg	5396
	1670 1675 1680 1685	
45	atc gtc ttg tcc ggg aag ccg gca att ata cct gac agg gag gtt ctc Ile Val Leu Ser Gly Lys Pro Ala Ile Ile Pro Asp Arg Glu Val Leu	5444
	1690 1695 1700	
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45	Gly	Leu	Leu	Thr	Pro	Gly	Ala	Lys	Gln	Asn	Ile	Gln	Leu	Ile	Asn	Thr
					405					410					415	
	Asn	Gly	Ser	Trp	His	Ile	Asn	Ser	Thr	Ala	Leu	Asn	Cys	Asn	Glu	Ser
				420					425					430		
50	Leu	Asn	Thr	Gly	Trp	Leu	Ala	Gly	Leu	Phe	Tyr	Gln	His	Lys	Phe	Asn
			435					440					445			
	Ser	Ser	Gly	Cys	Pro	Glu	Arg	Leu	Ala	Ser	Cys	Arg	Arg	Leu	Thr	Asp
							455					460				
	Phe	Ala	Gln	Gly	Trp	Gly	Pro	Ile	Ser	Tyr	Ala	Asn	Gly	Ser	Gly	Leu
	465					470					475				480	
55	Asp	Glu	Arg	Pro	Tyr	Cys	Trp	His	Tyr	Pro	Pro	Arg	Pro	Cys	Gly	Ile
					485					490					495	
	Val	Pro	Ala	Lys	Ser	Val	Cys	Gly	Pro	Val	Tyr	Cys	Phe	Thr	Pro	Ser
				500					505					510		
60	Pro	Val	Val	Val	Gly	Thr	Thr	Asp	Arg	Ser	Gly	Ala	Pro	Thr	Tyr	Ser
				515				520					525			
	Trp	Gly	Ala	Asn	Asp	Thr	Asp	Val	Phe	Val	Leu	Asn	Asn	Thr	Arg	Pro
		530					535					540				
	Pro	Leu	Gly	Asn	Trp	Phe	Gly	Cys	Thr	Trp	Met	Asn	Ser	Thr	Gly	Phe
	545					550					555				560	
65	Thr	Lys	Val	Cys	Gly	Ala	Pro	Pro	Cys	Val	Ile	Gly	Gly	Val	Gly	Asn
					565					570					575	

	Asn	Thr	Leu	Leu	Cys	Pro	Thr	Asp	Cys	Phe	Arg	Lys	His	Pro	Glu	Ala
			580						585					590		
	Thr	Tyr	Ser	Arg	Cys	Gly	Ser	Gly	Pro	Trp	Ile	Thr	Pro	Arg	Cys	Met
			595					600					605			
5	Val	Asp	Tyr	Pro	Tyr	Arg	Leu	Trp	His	Tyr	Pro	Cys	Thr	Ile	Asn	Tyr
		610					615					620				
	Thr	Ile	Phe	Lys	Val	Arg	Met	Tyr	Val	Gly	Gly	Val	Glu	His	Arg	Leu
		625				630					635					640
10	Glu	Ala	Ala	Cys	Asn	Trp	Thr	Arg	Gly	Glu	Arg	Cys	Asp	Leu	Glu	Asp
					645					650					655	
	Arg	Asp	Arg	Ser	Glu	Leu	Ser	Pro	Leu	Leu	Leu	Ser	Thr	Thr	Gln	Trp
				660					665					670		
	Gln	Val	Leu	Pro	Cys	Ser	Phe	Thr	Thr	Leu	Pro	Ala	Leu	Ser	Thr	Gly
				675				680					685			
15	Leu	Ile	His	Leu	His	Gln	Asn	Ile	Val	Asp	Val	Gln	Tyr	Leu	Tyr	Gly
		690					695					700				
	Val	Gly	Ser	Ser	Ile	Ala	Ser	Trp	Ala	Ile	Lys	Trp	Glu	Tyr	Val	Val
		705				710					715					720
20	Leu	Leu	Phe	Leu	Leu	Leu	Ala	Asp	Ala	Arg	Val	Cys	Ser	Cys	Leu	Trp
					725					730						735
	Met	Met	Leu	Leu	Ile	Ser	Gln	Ala	Glu	Ala	Ala	Leu	Glu	Asn	Leu	Val
				740					745						750	
	Ile	Leu	Asn	Ala	Ala	Ser	Leu	Ala	Gly	Thr	His	Gly	Leu	Val	Ser	Phe
			755					760					765			
25	Leu	Val	Phe	Phe	Cys	Phe	Ala	Trp	Tyr	Leu	Lys	Gly	Arg	Trp	Val	Pro
		770					775					780				
	Gly	Ala	Val	Tyr	Ala	Leu	Tyr	Gly	Met	Trp	Pro	Leu	Leu	Leu	Leu	Leu
		785				790					795					800
30	Leu	Ala	Leu	Pro	Gln	Arg	Ala	Tyr	Ala	Leu	Asp	Thr	Glu	Val	Ala	Ala
					805					810					815	
	Ser	Cys	Gly	Gly	Val	Val	Leu	Val	Gly	Leu	Met	Ala	Leu	Thr	Leu	Ser
				820					825					830		
	Pro	Tyr	Tyr	Lys	Arg	Tyr	Ile	Ser	Trp	Cys	Met	Trp	Trp	Leu	Gln	Tyr
			835					840					845			
35	Phe	Leu	Thr	Arg	Val	Glu	Ala	Gln	Leu	His	Val	Trp	Val	Pro	Pro	Leu
		850					855					860				
	Asn	Val	Arg	Gly	Gly	Arg	Asp	Ala	Val	Ile	Leu	Leu	Met	Cys	Val	Val
		865				870					875					880
40	His	Pro	Thr	Leu	Val	Phe	Asp	Ile	Thr	Lys	Leu	Leu	Leu	Ala	Ile	Phe
					885					890					895	
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			900						905					910		
	Val	Arg	Val	Gln	Gly	Leu	Leu	Arg	Ile	Cys	Ala	Leu	Ala	Arg	Lys	Ile
			915					920					925			
45	Ala	Gly	Gly	His	Tyr	Val	Gln	Met	Ala	Ile	Ile	Lys	Leu	Gly	Ala	Leu
		930					935					940				
	Thr	Gly	Thr	Tyr	Val	Tyr	Asn	His	Leu	Thr	Pro	Leu	Arg	Asp	Trp	Ala
		945				950					955					960
50	His	Asn	Gly	Leu	Arg	Asp	Leu	Ala	Val	Ala	Val	Glu	Pro	Val	Val	Phe
					965					970					975	
	Ser	Arg	Met	Glu	Thr	Lys	Leu	Ile	Thr	Trp	Gly	Ala	Asp	Thr	Ala	Ala
				980					985					990		
	Cys	Gly	Asp	Ile	Ile	Asn	Gly	Leu	Pro	Val	Ser	Ala	Arg	Arg	Gly	Gln
			995					1000					1005			
55	Glu	Ile	Leu	Leu	Gly	Pro	Ala	Asp	Gly	Met	Val	Ser	Lys	Gly	Trp	Arg
		1010					1015					1020				
	Leu	Leu	Ala	Pro	Ile	Thr	Ala	Tyr	Ala	Gln	Gln	Thr	Arg	Gly	Leu	Leu
		1025				1030					1035					1040
60	Gly	Cys	Ile	Ile	Thr	Ser	Leu	Thr	Gly	Arg	Asp	Lys	Asn	Gln	Val	Glu
					1045					1050					1055	
	Gly	Glu	Val	Gln	Ile	Val	Ser	Thr	Ala	Thr	Gln	Thr	Phe	Leu	Ala	Thr
				1060					1065				1070			
	Cys	Ile	Asn	Gly	Val	Cys	Trp	Thr	Val	Tyr	His	Gly	Ala	Gly	Thr	Arg
		1075						1080					1085			
65	Thr	Ile	Ala	Ser	Pro	Lys	Gly	Pro	Val	Ile	Gln	Met	Tyr	Thr	Asn	Val
		1090					1095						1100			

	Asp	Gln	Asp	Leu	Val	Gly	Trp	Pro	Ala	Pro	Gln	Gly	Ser	Arg	Ser	Leu	1105	1110	1115	1120
	Thr	Pro	Cys	Thr	Cys	Gly	Ser	Ser	Asp	Leu	Tyr	Leu	Val	Thr	Arg	His	1125	1130	1135	
5	Ala	Asp	Val	Ile	Pro	Val	Arg	Arg	Arg	Gly	Asp	Ser	Arg	Gly	Ser	Leu	1140	1145	1150	
	Leu	Ser	Pro	Arg	Pro	Ile	Ser	Tyr	Leu	Lys	Gly	Ser	Ser	Gly	Gly	Pro	1155	1160	1165	
10	Leu	Leu	Cys	Pro	Ala	Gly	His	Ala	Val	Gly	Leu	Phe	Arg	Ala	Ala	Val	1170	1175	1180	
	Cys	Thr	Arg	Gly	Val	Ala	Lys	Ala	Val	Asp	Phe	Ile	Pro	Val	Glu	Asn	1185	1190	1195	1200
	Leu	Gly	Thr	Thr	Met	Arg	Ser	Pro	Val	Phe	Thr	Asp	Asn	Ser	Ser	Pro	1205	1210	1215	
15	Pro	Ala	Val	Pro	Gln	Ser	Phe	Gln	Val	Ala	His	Leu	His	Ala	Pro	Thr	1220	1225	1230	
	Gly	Ser	Gly	Lys	Ser	Thr	Lys	Val	Pro	Ala	Ala	Tyr	Ala	Ala	Gln	Gly	1235	1240	1245	
20	Tyr	Lys	Val	Leu	Val	Leu	Asn	Pro	Ser	Val	Ala	Ala	Thr	Leu	Gly	Phe	1250	1255	1260	
	Gly	Ala	Tyr	Met	Ser	Lys	Ala	His	Gly	Val	Asp	Pro	Asn	Ile	Arg	Thr	1265	1270	1275	1280
	Gly	Val	Arg	Thr	Ile	Thr	Thr	Gly	Ser	Pro	Ile	Thr	Tyr	Ser	Thr	Tyr	1285	1290	1295	
25	Gly	Lys	Phe	Leu	Ala	Asp	Gly	Gly	Cys	Ser	Gly	Gly	Ala	Tyr	Asp	Ile	1300	1305	1310	
	Ile	Ile	Cys	Asp	Glu	Cys	His	Ser	Thr	Asp	Ala	Thr	Ser	Ile	Leu	Gly	1315	1320	1325	
30	Ile	Gly	Thr	Val	Leu	Asp	Gln	Ala	Glu	Thr	Ala	Gly	Ala	Arg	Leu	Val	1330	1335	1340	
	Val/Leu	Ala	Thr	Ala	Thr	Pro	Pro	Gly	Ser	Val	Thr	Val	Ser	His	Pro		1345	1350	1355	1360
	Asn	Ile	Glu	Glu	Val	Ala	Leu	Ser	Thr	Thr	Gly	Glu	Ile	Pro	Phe	Tyr	1365	1370	1375	
35	Gly	Lys	Ala	Ile	Pro	Leu	Glu	Val	Ile	Lys	Gly	Gly	Arg	His	Leu	Ile	1380	1385	1390	
	Phe	Cys	His	Ser	Lys	Lys	Lys	Cys	Asp	Glu	Leu	Ala	Ala	Lys	Leu	Val	1395	1400	1405	
40	Ala	Leu	Gly	Ile	Asn	Ala	Val	Ala	Tyr	Tyr	Arg	Gly	Leu	Asp	Val	Ser	1410	1415	1420	
	Val	Ile	Pro	Thr	Ser	Gly	Asp	Val	Val	Val	Val	Ser	Thr	Asp	Ala	Leu	1425	1430	1435	1440
	Met	Thr	Gly	Phe	Thr	Gly	Asp	Phe	Asp	Ser	Val	Ile	Asp	Cys	Asn	Thr	1445	1450	1455	
45	Cys	Val	Thr	Gln	Thr	Val	Asp	Phe	Ser	Leu	Asp	Pro	Thr	Phe	Thr	Ile	1460	1465	1470	
	Glu	Thr	Thr	Thr	Leu	Pro	Gln	Asp	Ala	Val	Ser	Arg	Thr	Gln	Arg	Arg	1475	1480	1485	
50	Gly	Arg	Thr	Gly	Arg	Gly	Lys	Pro	Gly	Ile	Tyr	Arg	Phe	Val	Ala	Pro	1490	1495	1500	
	Gly	Glu	Arg	Pro	Ser	Gly	Met	Phe	Asp	Ser	Ser	Val	Leu	Cys	Glu	Cys	1505	1510	1515	1520
	Tyr	Asp	Ala	Gly	Cys	Ala	Trp	Tyr	Glu	Leu	Thr	Pro	Ala	Glu	Thr	Thr	1525	1530	1535	
55	Val	Arg	Leu	Arg	Ala	Tyr	Met	Asn	Thr	Pro	Gly	Leu	Pro	Val	Cys	Gln	1540	1545	1550	
	Asp	His	Leu	Glu	Phe	Trp	Glu	Gly	Val	Phe	Thr	Gly	Leu	Thr	His	Ile	1555	1560	1565	
60	Asp	Ala	His	Phe	Leu	Ser	Gln	Thr	Lys	Gln	Ser	Gly	Glu	Asn	Phe	Pro	1570	1575	1580	
	Tyr	Leu	Val	Ala	Tyr	Gln	Ala	Thr	Val	Cys	Ala	Arg	Ala	Gln	Ala	Pro	1585	1590	1595	1600
	Pro	Pro	Ser	Trp	Asp	Gln	Met	Trp	Lys	Cys	Leu	Ile	Arg	Leu	Lys	Pro	1605	1610	1615	
65	Thr	Leu	His	Gly	Pro	Thr	Pro	Leu	Leu	Tyr	Arg	Leu	Gly	Ala	Val	Gln	1620	1625	1630	

	Asn	Glu	Val	Thr	Leu	Thr	His	Pro	Ile	Thr	Lys	Tyr	Ile	Met	Thr	Cys
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	Met	Ser	Ala	Asp	Leu	Glu	Val	Val	Thr	Ser	Thr	Trp	Val	Leu	Val	Gly
	1650							1655					1660			
5	Gly	Val	Leu	Ala	Ala	Leu	Ala	Ala	Tyr	Cys	Leu	Ser	Thr	Gly	Cys	Val
	1665							1670					1675			1680
	Val	Ile	Val	Gly	Arg	Ile	Val	Leu	Ser	Gly	Lys	Pro	Ala	Ile	Ile	Pro
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10	Asp	Arg	Glu	Val	Leu	Tyr	Gln	Glu	Phe	Asp	Glu	Met	Glu	Glu	Cys	Ser
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	Gln	His	Leu	Pro	Tyr	Ile	Glu	Gln	Gly	Met	Met	Leu	Ala	Glu	Gln	Phe
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	Lys	Gln	Lys	Ala	Leu	Gly	Leu	Leu	Gln	Thr	Ala	Ser	Arg	His	Ala	Glu
								1730					1735			1740
15	Val	Ile	Thr	Pro	Ala	Val	Gln	Thr	Asn	Trp	Gln	Lys	Leu	Glu	Val	Phe
	1745							1750					1755			1760
	Trp	Ala	Lys	His	Met	Trp	Asn	Phe	Ile	Ser	Gly	Ile	Gln	Tyr	Leu	Ala
								1765					1770			1775
20	Gly	Leu	Ser	Thr	Leu	Pro	Gly	Asn	Pro	Ala	Ile	Ala	Ser	Leu	Met	Ala
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	Phe	Thr	Ala	Ala	Val	Thr	Ser	Pro	Leu	Thr	Thr	Gly	Gln	Thr	Leu	Leu
								1795					1800			1805
	Phe	Asn	Ile	Leu	Gly	Gly	Trp	Val	Ala	Ala	Gln	Leu	Ala	Ala	Pro	Gly
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25	Ala	Ala	Thr	Ala	Phe	Val	Gly	Ala	Gly	Leu	Ala	Gly	Ala	Ala	Ile	Gly
	1825							1830					1835			1840
	Ser	Val	Gly	Leu	Gly	Lys	Val	Leu	Val	Asp	Ile	Leu	Ala	Gly	Tyr	Gly
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30	Ala	Gly	Val	Ala	Gly	Ala	Leu	Val	Ala	Phe	Lys	Ile	Met	Ser	Gly	Glu
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	Val	Pro	Ser	Thr	Glu	Asp	Leu	Val	Asn	Leu	Leu	Pro	Ala	Ile	Leu	Ser
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	Pro	Gly	Ala	Leu	Val	Val	Gly	Val	Val	Cys	Ala	Ala	Ile	Leu	Arg	Arg
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35	His	Val	Gly	Pro	Gly	Glu	Gly	Ala	Val	Gln	Trp	Met	Asn	Arg	Leu	Ile
	1905							1910					1915			1920
	Ala	Phe	Ala	Ser	Arg	Gly	Asn	His	Val	Ser	Pro	Thr	His	Tyr	Val	Pro
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40	Glu	Ser	Asp	Ala	Ala	Ala	Arg	Val	Thr	Ala	Ile	Leu	Ser	Ser	Leu	Thr
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	Val	Thr	Gln	Leu	Leu	Arg	Arg	Leu	His	Gln	Trp	Ile	Ser	Ser	Glu	Cys
								1955					1960			1965
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								1970					1975			1980
45	Cys	Glu	Val	Leu	Ser	Asp	Phe	Lys	Thr	Trp	Leu	Lys	Ala	Lys	Leu	Met
	1985							1990					1995			2000
	Pro	Gln	Leu	Pro	Gly	Ile	Pro	Phe	Val	Ser	Cys	Gln	Arg	Gly	Tyr	Arg
								2005					2010			2015
50	Gly	Val	Trp	Arg	Gly	Asp	Gly	Ile	Met	His	Thr	Arg	Cys	His	Cys	Gly
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	Ala	Glu	Ile	Thr	Gly	His	Val	Lys	Asn	Gly	Thr	Met	Arg	Ile	Val	Gly
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	Pro	Arg	Thr	Cys	Arg	Asn	Met	Trp	Ser	Gly	Thr	Phe	Pro	Ile	Asn	Ala
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55	Tyr	Thr	Thr	Gly	Pro	Cys	Thr	Pro	Leu	Pro	Ala	Pro	Asn	Tyr	Lys	Phe
	2065							2070					2075			2080
	Ala	Leu	Trp	Arg	Val	Ser	Ala	Glu	Glu	Tyr	Val	Glu	Ile	Arg	Arg	Val
								2085					2090			2095
60	Gly	Asp	Phe	His	Tyr	Val	Ser	Gly	Met	Thr	Thr	Asp	Asn	Leu	Lys	Cys
								2100					2105			2110
	Pro	Cys	Gln	Ile	Pro	Ser	Pro	Glu	Phe	Phe	Thr	Glu	Leu	Asp	Gly	Val
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	Arg	Leu	His	Arg	Phe	Ala	Pro	Pro	Cys	Lys	Pro	Leu	Leu	Arg	Glu	Glu
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65	Val	Ser	Phe	Arg	Val	Gly	Leu	His	Glu	Tyr	Pro	Val	Gly	Ser	Gln	Leu
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Pro Cys Glu Pro Glu Pro Asp Val Ala Val Leu Thr Ser Met Leu Thr
 2165 2170 2175
 Asp Pro Ser His Ile Thr Ala Glu Ala Ala Gly Arg Arg Leu Ala Arg
 2180 2185 2190
 5 Gly Ser Pro Pro Ser Met Ala Ser Ser Ala Ser Gln Leu Ser Ala
 2195 2200 2205
 Pro Ser Leu Lys Ala Thr Cys Thr Ala Asn His Asp Ser Pro Asp Ala
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 2225 2230 2235 2240
 Ile Thr Arg Val Glu Ser Glu Asn Lys Val Val Ile Leu Asp Ser Phe
 2245 2250 2255
 Asp Pro Leu Val Ala Glu Glu Asp Glu Arg Glu Val Ser Val Pro Ala
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 15 Glu Ile Leu Arg Lys Ser Arg Arg Phe Ala Arg Ala Leu Pro Val Trp
 2275 2280 2285
 Ala Arg Pro Asp Tyr Asn Pro Pro Leu Val Glu Thr Trp Lys Lys Pro
 2290 2295 2300
 20 Asp Tyr Glu Pro Pro Val Val His Gly Cys Pro Leu Pro Pro Pro Arg
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 2355 2360 2365
 Ser Glu Pro Ala Pro Ser Gly Cys Pro Pro Asp Ser Asp Val Glu Ser
 2370 2375 2380
 30 Tyr Ser Ser Met Pro Pro Leu Glu Gly Glu Pro Gly Asp Pro Asp Leu
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 Ser/Asp Gly Ser Trp Ser Thr Val Ser Ser Gly Ala Asp Thr Glu Asp
 2405 2410 2415
 Val Val Cys Cys Ser Met Ser Tyr Ser Trp Thr Gly Ala Leu Val Thr
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Ser Arg Gly Glu Asn Cys Gly Tyr Arg Arg Cys Arg Ala Ser Gly Val
 2690 2695 2700
 Leu Thr Thr Ser Cys Gly Asn Thr Leu Thr Cys Tyr Ile Lys Ala Arg
 2705 2710 2715 2720
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 2725 2730 2735
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 2755 2760 2765
 Pro Pro Gly Asp Pro Pro Gln Pro Glu Tyr Asp Leu Glu Leu Ile Thr
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 Primer

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21

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19

5